JAN 10 2006

CERTIFIED MAIL 7004 1160 0000 3793 6849
RETURN RECEIPT REQUESTED

Mr. Bill Hay
CWI, White Oaks
P.O. Box 13355
Monroe, Louisiana 71207

RE: CWI, White Oaks Landfill
Notice of Technical Completeness
AI 41194, PER20050001, D-073-7744, P-0357
Ouachita Parish

Dear Mr. Hay:

The Water and Waste Permits Division is in receipt of the finalized copies of your permit modification request dated December 2, 2005. After review of this submittal, we have determined that your modification request is technically complete and ready for public review. This request proposes changing the white liner to black, an optional GS/GCH/clay for the secondary liner and piggyback slopes, and a performance based specification for the leachate collection system.

The Environmental Assistance Division will distribute copies of your modification for public review and place public notices in the appropriate newspapers in accordance with LAC 33:VII.513.F.3. Please contact Ms. Soumaya Ghosn at (225) 219-3276 for the date of publication and the dates for the comment period. At the conclusion of the comment period, the Water and Waste Permits Division will consider all comments and a decision will be made regarding your modification request.

Please reference Site Identification Number D-073-7744, Agency Interest Number 41194 and Permit Activity Number (PER20050001) on all future correspondence pertaining to this facility. If you have any questions concerning this matter, please contact Mr. Jesse Deroche at (225) 219-3065.

Sincerely,

Lenny M. Young

Lenny Young
Administrator
Water and Waste Permits Division

jd

c: Turner Environmental, Inc.
Northeast Regional Office
Jason Meyers, OEA/ETD

# VERIFICATION BY FIRST FLOOR PUBLIC RECORDS CENTER

THIS INFORMATION MUST BE AVAILABLE FOR PUBLIC VIEWING
AT 8:00AM on
(Wednesday, January 18, 2006)

The undersigned verifies that a copy of the technically complete solid waste permit modification application with an amended environmental assessment statement and public notice has been received by the First Floor Public Records Center for this facility.

**Re:** **Request for Public Comment on a Technically Complete Solid Waste Permit Modification**
**CWI, White Oaks Landfill, LLC**
**Monroe, Ouachita Parish, Louisiana**
**Agency Interest No. 41194, P-0357, Activity Tracking Number PER20050001**

FIRST FLOOR PUBLIC RECORDS CENTER:

By: RM Date: 1-13-06

The Public Participation Group contact for this packet of information is
Laura Ambeau, Rm. 321-31, 2-3277

# SOLID WASTE STANDARD PERMIT MODIFICATION APPLICATION
# CWI - WHITE OAKS TYPE I/II/III LANDFILL
# MONROE, OUACHITA PARISH, LOUISIANA

**CWI - WHITE OAKS LANDFILL, LLC**
**AGENCY INTEREST NO. 41194**
**SOLID WASTE SITE ID NO. D-073-7744**
**PERMIT NO. P-0357**
**MONROE, OUACHITA PARISH, LOUISIANA**

***Prepared For:***

**Consolidated Waste Industries**

Excellence in Solid Waste Management

*CWI - WHITE OAKS LANDFILL, LLC*
MONROE, LOUISIANA

**DECEMBER**2005

STATE OF LOUISIANA
W. THOMAS TURNER
REG. No. 22118
REGISTERED PROFESSIONAL ENGINEER
IN
CIVIL ENGINEERING

***Prepared By:***

TURNER
SM ENVIRONMENTAL

RECEIVED
DEC 0 2 2005
LDEQ

TURNER ENVIRONMENTAL, INC.
7918 Wrenwood Blvd, Suite C • Baton Rouge, Louisiana 70809
TEL (225) 926-4300 • FAX (225) 926-4360
www.teius.com

TURNER
ENVIRONMENTAL

**December 1, 2005**

original to IOSW
Scan copy to SW | G3 | O'Neal
AVG

Louisiana Department of Environmental Quality
Office of Environmental Services
Permit Division - Waste Permit Section
P.O. Box 4313
Baton Rouge, LA 70821-4313

Attention: Ms. Mia Townsel

**Re: Transmittal**
**Solid Waste Standard Permit Modification Application**
**CWI – White Oaks Landfill (Type I/II/III)**
**Agency Interest No. 41194**
**Facility ID/Permit No. D-073-7744-P-0357**
**Monroe, Ouachita Parish, Louisiana**

Dear Ms. Townsel:

In accordance with the requirements of LAC 33:VII.517, Turner Environmental, Inc. (TEI), on behalf of Consolidated Waste Industries (CWI), and the CWI – White Oaks Landfill, Monroe, Ouachita Parish, Louisiana, hereby submits six copies of the subject permit modification application for review and approval by LDEQ.

For each modification, we have attached a detailed description and justification information, revised drawings and calculations (as appropriate), and, where applicable, revised permit application text. The revised permit application text is presented in edit format (i.e., added text is underlined, deleted text is struck through) for ease of review. Only portions of the permit application text with proposed changes are submitted herewith; these sections include Part II (33:VII.521) Section F; Part III (33:VII.523) Sections A and E; and Appendix G (Construction Quality Assurance Plan). Additional calculations to be inserted in Appendix F (Design Calculations and Analyses Package) are also included, and a revised Addendum 1701 is shown in Exhibit 1. The table of contents from the original permit application is included for your reference.

Thank you for your assistance in this matter. A check for the permit modification review fee, in the amount of $1,320.00, was delivered to you on August 5, 2005. Should you have any questions or if we can be of assistance to you in any way, please do not hesitate to contact me at (225) 926-4300, extension 17.

Very truly yours,

TURNER ENVIRONMENTAL, INC.

W. Thomas Turner, P.E.
President

WTT
Enclosures

CONSULTING ENGINEERS AND SCIENTISTS
7918 Wrenwood Blvd, Suite C
Baton Rouge, Louisiana 70809
PHONE (225) 926-4300
FAX (225) 926-4360

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# INTRODUCTION

# SOLID WASTE STANDARD PERMIT MODIFICATION APPLICATION
# CWI – WHITE OAKS TYPE I/II/III LANDFILL
# MONROE, OUACHITA PARISH, LOUISIANA
# LDEQ SOLID WASTE STANDARD TYPE I/II/III
## PERMIT NO. P-0357

**AUGUST 2005**

*Prepared For:*

**CWI - WHITE OAKS LANDFILL, LLC**
**MONROE, LOUISIANA**

# SOLID WASTE STANDARD PERMIT MODIFICATION APPLICATION
# CWI – WHITE OAKS TYPE I/II/III LANDFILL
# MONROE, OUACHITA PARISH, LOUISIANA

## Table of Contents

# Solid Waste Standard Permit Modification Application CWI – White Oaks Type I/II/III Landfill

## Monroe, Ouachita Parish, Louisiana LDEQ Solid Waste Standard Type I/II/III Permit No. P-0357

## 1.0 INTRODUCTION

This Solid Waste Standard Permit Modification Application has been prepared by Turner Environmental, Inc. (TEI) as professional consultants, on behalf of our client CWI – White Oaks Landfill, LLC (CWI, Owner) for their Type I/II/III landfill in Ouachita Parish near Monroe, Louisiana.

This permit modification application is being submitted for CWI's Standard Solid Waste Permit No. P-0357 issued for CWI – White Oaks Landfill under the Louisiana Solid Waste Rules and Regulations. This landfill is classified as a Type I/II/III landfill by the Louisiana Solid Waste Regulations (LAC 33:VII.Subpart 1). This modification application describes the following proposed changes to the permitted design:

- Modification of the primary liner in the Type I/II landfill cell and piggyback slopes;
- Modification of the secondary liner in the Type I/II landfill cell and piggyback slopes; and
- Modification of the leachate collection system on the Type I/II landfill cell side slopes and piggyback slopes.

None of the proposed modifications will increase the volume of waste to be received in the Type I/II landfill cell; additionally, the proposed modifications will not alter the footprint of the solid waste disposal facility nor will they affect the accepted waste stream.

## 2.0 HISTORY OF SOLID WASTE PERMIT P-0357

On November 6, 1996 the Louisiana Department of Environmental Quality, Office of Environmental Affairs, Solid Waste Division (LDEQ) issued Standard Type III Permit No. P-0307 to Littleton Enterprises, Inc. of Monroe, Ouachita Parish, Louisiana, to construct and operate a Type III solid waste landfill in Monroe, Louisiana. The landfill was permitted and was to be constructed and operated in accordance with LAC 33:VII.719.D – Standards Governing All Minor Processing and Disposal Facilities (Type III) and LAC 33: VII.721.D – Construction and Demolition Debris and Woodwaste Landfills and Processing Facilities (Type III). The proposed landfill was to be constructed adjacent to an existing Type I/II landfill, which had been operated by Browning-Ferris Industries, Inc. (BFI). The BFI landfill ceased operations in 1993 and was subsequently closed in accordance with LDEQ regulations. The BFI landfill is currently in post-closure. The location of the proposed Littleton Enterprises, Inc. Type III landfill had originally been intended for expansion of the BFI Type I/II landfill. However, BFI abandoned the expansion project, whereupon Littleton Enterprises, Inc. leased the property from the landowner, Mr. Fred W. Huenefeld, Jr., for the purposes of constructing and operating a Type III landfill. Ultimately, although the LDEQ had issued the Type III permit for the property, Littleton Enterprises, Inc. never initiated the project.

In the fall of 1998, Consolidated Waste Industries, Inc. of Atlanta, Georgia (the parent company of CWI - White Oaks Landfill, LLC) approached the LDEQ and proposed to proceed with the construction of the Type III landfill in accordance with the Littleton Enterprises, Inc. permit. In an effort to expedite the opening of the landfill, CWI proposed to construct the first two waste cells and the contact water holding/sedimentation pond of the Type III landfill in accordance with the original permit.

Once these original cells were brought into operation, CWI proposed to modify the permit to alter the construction of the permitted Type III landfill and to expand the proposed landfill to include additional waste cells to be constructed at separate locations at the site. One portion of the proposed expansion would be constructed in the abandoned borrow pit, located on the site just north of the BFI landfill, from which materials had been used to construct the BFI Type I/II landfill. A second portion would be constructed in an open section in the northeast section of the property. Accordingly, the LDEQ requested that CWI submit the required permit modification in accordance with LAC 33:VII.517 for approval.

CWI petitioned the LDEQ in May 1999 to transfer all Littleton Enterprises, Inc. permits for the Type III landfill to CWI. Additionally, CWI purchased the necessary properties to complete the expanded project from the property owner, Mr. Fred W. Huenefeld, Jr. Littleton Enterprises, Inc.'s Standard Type III and Louisiana Pollution Discharge Elimination System (LPDES) permits for the Type III landfill were transferred to CWI by LDEQ permit modifications on May 17, 1999 and June 3, 1999, respectively. As required by LDEQ to finalize the solid waste permit transference, CWI submitted a new, modified Part I: Permit Application Form (LAC 33:VII.519) and original financial assurance documents to reflect the new ownership. These documents were submitted to the LDEQ on June 18, 1999 and subsequently accepted into the record by LDEQ.

During the months of May and June, 1999, CWI constructed the first two waste cells, the contact water sedimentation pond, and appurtenant facilities in accordance with the permit and as necessary to begin accepting waste at the landfill. An Order to Commence was granted by the LDEQ in their letter dated July 2, 1999. In their letter of July 13, 1999, the LDEQ confirmed that the facility's construction was in full compliance with the permit.

On February 14, 2002, TEI, on behalf of CWI – White Oaks Landfill, submitted a Solid Waste Standard Permit Application for Type I/II Landfill & Solid Waste Standard Permit Modification Application for Type III Landfill to the LDEQ. On August 10, 2002, CWI's permit application was approved by issuance of LDEQ Permit No. P-0357, thus granting CWI permission to alter the construction of the originally permitted (P-0307) Type III landfill cells in order to increase their capacity. In addition, CWI was granted permission to add a Type I (industrial) and Type II (residential and commercial) cell at the facility, and revise the facility construction, capacity and operations accordingly.

Based on the approved permit application, TEI completed construction documents (final design drawings and specifications) in November 2002. The Owner received bids on the construction in December 2002 and subsequently selected a contractor. On April 21, 2003, CWI began formal construction of the project in accordance with Permit No. P-0357. In addition to construction of the cell, associated impoundments, and appurtenances, installation of ten monitoring wells and three piezometers was completed June 25, 2003, in accordance with CWI's approved Groundwater Monitoring Plan (GWMP). Registration of the wells with the Louisiana Department of Transportation and Development was completed after their installation. Major construction activities were completed on July 2, 2003. White Oaks Landfill began accepting Type I/II wastes immediately after receiving the Order Authorizing Commencement of Operation from LDEQ on July 31, 2003.

# 3.0 PROPOSED MODIFICATIONS

## 3.1 FORMAT OF PERMIT MODIFICATION APPLICATION

The proposed modifications to the permit are described in detail in the following Sections (3.2 through 3.4). The modifications proposed include:

- Eliminate color requirement for the primary liner in the Type I/II landfill cell and piggyback slopes (60 mil HDPE textured geomembrane);
- Allow installation of a conventional secondary liner (3 feet of compacted clay, as per LAC 33:VII.711.B.5.d.ii) in the Type I/II landfill cell and piggyback slopes as an alternative to the permitted secondary liner (geomembrane-supported geosynthetic clay liner, GS/GCL); and
- Eliminate "tri-planar" requirement for geocomposite to be installed on the Type I/II landfill cell side slopes and piggyback slopes.

Modifications to the permit application document are presented in the attached Solid Waste Standard Permit Modification Application for Type I/II Landfill. Where a modification to the original permit application text is proposed, the following method of reference is used:

- Only figures with changes resulting from the proposed modifications are included herewith. Figures included in this modification application are numbered the same as the corresponding figures presented in the approved permit application. Modifications to previously submitted figures are shown in red.
- Only sections of the permit with text changes resulting from the proposed modifications are included herewith. Text that is added by the modification is identified by underlining; and
- Text that is eliminated by the modification is identified by ~~strikethrough~~.

## 3.2 MODIFICATION OF THE PRIMARY LINER

CWI proposes to eliminate the color requirement for the primary liner; the modified permit text will still specify a 60 mil HDPE textured geomembrane, as per LAC 33:VII.711.B.5.d.ii. In the approved permit text, the primary geomembrane was specified as a white liner. Although white-surfaced geomembranes are less susceptible than black geomembranes to thermally-induced wrinkling, future expansions at White Oaks Landfill are to be constructed in five to ten-acre phases. Therefore, the areas to be covered are relatively small and such thermally-induced wrinkling is not expected to be an issue. However, the installation process will be closely monitored to avoid thermally-induced wrinkling problems and to ensure that intimate contact is maintained with the secondary liner below.

## 3.3 Modification of the Secondary Liner

Since the preparation of the permit application, new clay borrow sources adjacent to the site have become available. These sources should contain an ample supply of suitable clay that can be used for construction of a compacted clay liner. Therefore, CWI proposes to specify both a geomembrane-supported geosynthetic clay liner (GS/GCL) and a three-foot compacted clay liner (CCL) as satisfactory secondary liner options for installation into the landfill cell and on the piggyback slopes.

Currently, CWI's permit calls for installation of a GS/GCL as the secondary liner. If, at the time of construction, the conventional secondary liner (3' CCL) is selected for installation, it will be constructed as per LAC 33:VII.711.B.5.d.ii. Additionally, all Quality Assurance details outlined in the CQA plan for clay liner installation will be strictly enforced. A maximum hydraulic conductivity of $1 \times 10^{-7}$ cm/sec will be maintained.

## 3.4 Modification of the Leachate Collection System

CWI proposes to eliminate "tri-planar" requirement for the geocomposite of the Type I/II cell side slopes and piggyback slopes. The "tri-planar" designation, a product-based term, would be replaced with a performance-based specification that requires manufacturer testing to demonstrate that the product proposed at the time of construction is capable of producing the required transmissivity. The required transmissivity must be demonstrated under White Oaks Landfill field-specific conditions, to include: seating time, boundary conditions, and overburden pressure.

Specifications for the drainage layer geocomposite still call for 8 oz. non-woven geotextiles above and below the geonet; however, instead of specifying tri-planar geocomposite, a detailed design calculation was performed to determine the required and allowable transmissivities based on site-specific conditions. The entire drainage layer geocomposite calculation package is shown in Appendix F.4. A summary is presented below:

**HELP Model Summary of Analysis**

Leachate volume calculations were performed for several scenarios. These scenarios range from the newly constructed piggyback area slope to the completion of waste placement in the piggyback area. Since this calculation was being conducted to obtain a worst-case design scenario for the geocomposite drainage layer, the landfill was modeled prior to final cover installation. The leachate volumes were estimated using the Hydrologic Evaluation of Landfill Performance (HELP) Model, Version 3.0.7.

The four scenarios created for the HELP model are listed and described below. Since the slope of geonet affects its transmissivity, both slopes of the piggyback area bench and slope system, 4% and 25%, respectively, were entered into the HELP Model and into the subsequent transmissivity calculations to ensure a conservative design. The bench gradient (4%) was input into Trial A of the profiles, while the slope gradient (25%) was input into Trial B.

Scenarios A and B were composed of two different profiles so that the portion of the model area covered with waste could be analyzed separately from the area without waste. Because a minimum 8-inch rainfall event was needed for modeling purposes, the HELP Model's synthetic weather data was generated for a seventy-five year period for Shreveport, Louisiana (the nearest available city to White Oaks Landfill). However, average monthly precipitation totals for the New Orleans area (obtained from NOAA's National Weather Service Forecast Baton Rouge/New Orleans Office) were entered manually into the HELP Model's synthetic precipitation data list because the values for Shreveport did not produce a sufficient rain event.

**Scenario A**

- **Profile 1** represents the waste installed on the 3(H):1(V) side slopes of the Type I/II cell. This profile was modeled with 1' of interim compacted cover as the top layer. Both Trial A and B were modeled with a geonet slope of 33.3%. The entire 1.6 acres of 3(H):1(V) side slope beneath the piggyback slope were modeled. Since the height of waste varied from 0 to 16.2' (minus 2' for interim and operational cover), an average height of waste of 7.1' was used.

- **Profile 2** represents the piggyback slope when no waste has been placed and only 1 foot of operational cover has been installed over the geocomposite drainage layer. Trial A was modeled with a geonet slope of 4% while Trial B was modeled with a geonet slope of 25%. The entire 5.9 acres of the piggyback slope were used in this profile.

**Scenario B**

- **Profile 3** represents the operational phase when three 10'-thick horizontal lifts of waste have been placed on the piggyback slope and no interim cover has been placed. This profile extends from the bottom of the 3(H):1(V) side slope up to the top of the piggyback waste for an average waste height of 21.25'. Trial A was modeled with a geonet slope of 4% while Trial B was modeled with a geonet slope of 25%. The 3(H):1(V) side slope and the covered portion of the piggyback slope were modeled for a total area of 4.55 acres.

- **Profile 4** represents the portion of the piggyback slope upon which no waste has been placed and only 1 foot of operational cover has been installed over the geocomposite drainage layer. Trial A was modeled with a geonet slope of 4% while Trial B was modeled with a geonet slope of 25%. The remaining 2.95 acres of the piggyback slope were used in this profile.

### Scenario C

- **Scenario C** represents the operational phase when five 10'-thick horizontal lifts of waste have been placed on the piggyback slope and no interim cover has been placed. This profile extends from the bottom of the 3(H):1(V) side slope up to the top of the Type III waste for an average waste height of 31.85'. Trial A was modeled with a geonet slope of 4% while Trial B was modeled with a geonet slope of 25%. The 3(H):1(V) side slope and the entire piggyback slope were modeled for a total area of 7.5 acres.

### Scenario D

- **Scenario D** represents the operational phase when the maximum height of waste has been placed on the piggyback slope and no interim cover or final cover has been placed. This profile extends from the bottom of the 3(H):1(V) side slope up to the maximum waste placement elevation (138 ft, MSL) for an average waste height of 41.85'. Trial A was modeled with a geonet slope of 4% while Trial B was modeled with a geonet slope of 25%. The 3(H):1(V) side slope and the entire piggyback slope were modeled for a total area of 7.5 acres.

Raw Data resulting from the HELP Model for each of the six profiles is attached. The estimated leachate volumes generated for the different profiles is summarized as follows:

**Table 1. HELP Model Results**

| Scenario | Peak Daily Leachate ($ft^3$/day) | Area, acres ($ft^2$) | Liquid Impingement Rate, q[1] (ft/sec) |
|---|---|---|---|
| Profile 1 – Trial A | 1,195.16 | | |
| Profile 2 – Trial A | 10,595.10 | | |
| **Scenario A (Trial A)** | **11,790.26** | **7.5 (326,700)** | **$4.18 \times 10^{-7}$** |
| Profile 1 – Trial B | 1,127.75 | | |
| Profile 2 – Trial B | 8,042.09 | | |
| Scenario A (Trial B) | 9,169.84 | 7.5 (326,700) | $3.25 \times 10^{-7}$ |
| | | | |
| Profile 3 – Trial A | 5,384.57 | | |
| Profile 4 – Trial A | 4,552.40 | | |
| **Scenario B (Trial A)** | **9,936.97** | **7.5 (326,700)** | **$3.52 \times 10^{-7}$** |
| Profile 3 – Trial B | 5,285.29 | | |
| Profile 4 – Trial B | 3,831.92 | | |
| Scenario B (Trial B) | 9,117.21 | 7.5 (326,700) | $3.23 \times 10^{-7}$ |
| | | | |
| **Scenario C (Trial A)** | **7,745.17** | **7.5 (326,700)** | **$2.74 \times 10^{-7}$** |
| Scenario C (Trial B) | 7,737.22 | 7.5 (326,700) | $2.74 \times 10^{-7}$ |
| | | | |
| **Scenario D (Trial A)** | **7,067.84** | **7.5 (326,700)** | **$2.50 \times 10^{-7}$** |
| Scenario D (Trial B) | 7,059.21 | 7.5 (326,700) | $2.50 \times 10^{-7}$ |

1. Impingement rates were determined by dividing the peak daily leachate value by the area in square feet and converting by 86,400 seconds/day.

**Determine Required Transmissivity**

Giroud's method for calculating the "required" transmissivity ($\theta_{req}$) of relatively low-thickness layers of geonets and geocomposites (Ref. 1):

$$\theta_{req} = \frac{q_i \bullet L}{\sin \beta} \qquad \textit{Equation [1]}$$

where:

- $\theta_{req}$ = required transmissivity for geocomposites ($ft^3$/sec per ft width)
- $q_i$ = liquid impingement rate (ft/sec)
- L = horizontal length of slope (ft)
- $\beta$ = slope angle (degrees)

The input parameters for Equation [1] are governed by the geometry of the design. The inputs used in the four different Scenarios, each containing two trials, are shown below in Table 2.

**Table 2. Required Transmissivity Calculations[1]**

| Scenario | $q_i$ (ft/sec) | L (ft) | $\beta$ (degrees) | $\theta_{req}$ ($ft^2$/sec) |
|---|---|---|---|---|
| Scenario A (Trial A) | $4.18 \times 10^{-7}$ | 370 | 2.29 | $3.87 \times 10^{-3}$ |
| Scenario A (Trial B) | $3.25 \times 10^{-7}$ | 370 | 14.04 | $4.95 \times 10^{-4}$ |
| Scenario B (Trial A) | $3.52 \times 10^{-7}$ | 370 | 2.29 | $3.26 \times 10^{-3}$ |
| Scenario B (Trial B) | $3.23 \times 10^{-7}$ | 370 | 14.04 | $4.93 \times 10^{-4}$ |
| Scenario C (Trial A) | $2.74 \times 10^{-7}$ | 370 | 2.29 | $2.54 \times 10^{-3}$ |
| Scenario C (Trial B) | $2.74 \times 10^{-7}$ | 370 | 14.04 | $4.18 \times 10^{-4}$ |
| Scenario D (Trial A) | $2.50 \times 10^{-7}$ | 370 | 2.29 | $2.32 \times 10^{-3}$ |
| Scenario D (Trial B) | $2.50 \times 10^{-7}$ | 370 | 14.04 | $3.81 \times 10^{-4}$ |

1. Required transmissivity was calculated in one operation to avoid rounding errors; therefore, displayed $q_i$ values should not be used to perform verification calculations.

**Establish Allowable Transmissivity**

$$\theta_{allow} = \theta_{req} \bullet FS_D \bullet RF_{CR} \bullet RF_{CC} \bullet RF_{BC} \qquad \textit{Equation [2]}$$

where:

- $\theta_{allow}$ = minimum allowable transmissivity of geocomposite (ft3/sec per ft width)
- $\theta_{req}$ = required transmissivity for geocomposites (ft3/sec per ft width)
- $FS_D$ = overall factor of safety for drainage (dimensionless, recommended values from 2 to 3)

$RF_{CR}$ = reduction factor for long-term creep (dimensionless, based on normal pressure caused by overburden)

$RF_{CC}$ = reduction factor for chemical clogging (dimensionless, recommended values 1.5 to 2.0)

$RF_{BC}$ = reduction factor for biological clogging (dimensionless, recommended values 1.1 to 1.3)

| Table 3. Allowable Transmissivity Calculations[4] | | | | | | | |
|---|---|---|---|---|---|---|---|
| Scenario | $\theta_{req}$ ($ft^2$/sec) | $FS_D$[1] | Normal Stress, psf[2] | $RF_{CR}$[3] | $RF_{CC}$ | $RF_{BC}$ | $\theta_{allow}$ ($ft^2$/sec) |
| Scenario A (Trial A) | $3.87 \times 10^{-3}$ | 2.0 | 971.2 | 1.1 | 1.5 | 1.1 | $1.40 \times 10^{-2}$ |
| Scenario A (Trial B) | $4.95 \times 10^{-4}$ | 2.0 | 943.1 | 1.1 | 1.5 | 1.1 | $1.80 \times 10^{-3}$ |
| Scenario B (Trial A) | $3.26 \times 10^{-3}$ | 2.33 | 2,607.9 | 1.15 | 1.67 | 1.17 | $1.71 \times 10^{-2}$ |
| Scenario B (Trial B) | $4.93 \times 10^{-4}$ | 2.33 | 2,532.5 | 1.15 | 1.67 | 1.17 | $2.58 \times 10^{-3}$ |
| Scenario C (Trial A) | $2.54 \times 10^{-3}$ | 2.66 | 3,878.9 | 1.2 | 1.83 | 1.23 | $1.83 \times 10^{-2}$ |
| Scenario C (Trial B) | $4.18 \times 10^{-4}$ | 2.66 | 3,766.7 | 1.2 | 1.83 | 1.23 | $3.00 \times 10^{-3}$ |
| **Scenario D (Trial A)** | $\mathbf{2.32 \times 10^{-3}}$ | **3.0** | **5,077.9** | **1.2** | **2.0** | **1.3** | $\mathbf{2.17 \times 10^{-2}}$ |
| Scenario D (Trial B) | $3.81 \times 10^{-4}$ | 3.0 | 4,930.2 | 1.2 | 2.0 | 1.3 | $3.57 \times 10^{-3}$ |

1. Drainage factor of safety ($FS_D$) was increased as waste placement progressed due to increased safety risks, repair costs, and unknowns.
2. Normal stress calculated with a waste unit weight of 60 lb/$ft^3$ and an angle of 2.29° (4%, Trial A) or 14.04° (4:1, Trial B), as appropriate. Normal stresses used to determine creep reduction factors. Waste heights shown on attached Figures.
3. Creep reduction factors listed in Table 4.5 of Reference 1 are 1.1 for 1,000 psf and 1.2 for 5,000 psf.
4. Allowable transmissivity was calculated in one operation to avoid rounding errors; therefore, displayed required transmissivity values should not be used to perform verification calculations.

**Conclusion**

As shown in Table 3, Scenario D Trials A and B produced the largest allowable transmissivity for their respective slopes. Therefore, in the geocomposite specification shown in the CQA plan, performance testing will be required to demonstrate that the allowable transmissivities can be achieved with the following design criteria:

| Table 4. Performance Testing Standards for Double-sided Geocomposite w/ 8 oz. Non-woven Geotextiles | | | | |
|---|---|---|---|---|
| $\theta_{100}$ ($ft^2$/sec) | Gradient | Seating Time, hrs | Normal Stress, psf | Boundary Conditions |
| $2.17 \times 10^{-2}$ | 0.04 | 100 | 5,000 | Soil/geocomposite/geomembrane |
| $3.57 \times 10^{-3}$ | 0.25 | 100 | 5,000 | Soil/geocomposite/geomembrane |

Exhibit 1

Addendum 1701

UNITED STATES OF AMERICA

UNION JUSTICE AND CONFIDENCE

# State of Louisiana

## Fox McKeithen
### SECRETARY OF STATE

*As Secretary of State, of the State of Louisiana, I do hereby Certify that*

the Application Form for Certificate of Authority of

CONSOLIDATED WASTE INDUSTRIES, INC.

Domiciled at ATLANTA, GEORGIA,

Was filed and recorded in this Office on December 10, 1999,

Thus authorizing the corporation to exercise the same powers, rights and privileges accorded similar domestic corporations, subject to the provisions of R. S. 1950, Title 12, Chapter 3, and other applicable laws.

*In testimony whereof, I have hereunto set my hand and caused the Seal of my Office to be affixed at the City of Baton Rouge on,*

December 10, 1999

Fox McKeithen

BBE 34866769E

*Secretary of State*

UNITED STATES OF AMERICA

# State of Louisiana

**Fox McKeithen**

**SECRETARY OF STATE**

*As Secretary of State, of the State of Louisiana, I do hereby Certify that*

the Application Form for Certificate of Authority of

CWI-WHITE OAKS LANDFILL, LLC

Domiciled at ATLANTA, GEORGIA,

Was filed and recorded in this Office on May 03, 1999,

Thus authorizing the limited liability company to exercise the same rights and privileges accorded similar domestic limited liability companies, subject to the provisions of R. S. Title 12, Chapter 22, Part VIII.

*In testimony whereof, I have hereunto set my hand and caused the Seal of my Office to be affixed at the City of Baton Rouge on,*

May 3, 1999

Fox McKeithen

BBE 34783496Q

*Secretary of State*

STATE OF LOUISIANA · UNION JUSTICE CONFIDENCE · SECRETARY OF STATE

# PART II
# SUPPLEMENTARY INFORMATION

**2. The following information on plans and specifications is required for Type I and II facilities:**

**a. detailed plan-view drawings showing original contours, proposed elevations of the base of units prior to installation of the liner system, and boring locations;**

Response:

The White Oaks Landfill currently operates as a Type III landfill. Original contours of the site are shown on Figure 5. This application proposes the lateral expansion of the facility as shown on Figure 6. In addition to the lateral expansion, this application also proposes to expand the waste streams accepted at the facility to include Type I (Industrial) and Type II (residential and commercial) solid waste. These wastes will be landfilled separately from the Type III wastes in cells constructed in accordance with the requirements of LAC 33:VII.709, 711, and 713. Type I/II and Type III areas of the landfill will be operated in accordance with the Facility Operations Plan in Appendix B. Due to the proposed use of separate areas to dispose of Type I/II and Type III wastes, and the difficulty in determining long-term disposal volume distributions between the two types of wastes, CWI anticipates that the ultimate aerial and volumetric distribution of Type I/II and Type III may vary significantly from initial estimates.

To accommodate this unknown variability, CWI has designed the facility to be flexible relative to the aerial and volumetric distribution of the two waste streams. The design presented here assumes a lifetime minimal volume for Type I/II wastes. Figure 21 shows the proposed elevations of the base of units prior to the installation of the liner system in this minimal Type I/II area configuration. As shown on the figure, of the approximately 85 acres within the proposed footprint of the facility, approximately 30 acres of this footprint will be constructed and operated as a Type I/II cell. Approximately 8 acres within the Type III area will be constructed as a "piggybacked" Type I/II area on top of Type III waste, as discussed in the response to LAC 33:521.B.2.b, above, and as discussed in detail in the response to LAC 33:521.F.4.b and c, below. Based on the airspace volume calculations presented in Appendix F, Part F.1, this 38 acres will accommodate approximately 1.74 million cubic yards (in place) of Type I/II waste.

Expected maximum disposal volume at the Type I/II cell is 500 tons per day. Operating 5.5 days per week and 52 weeks per year, this equates to approximately 143,000 tons per year. Assuming an in-place waste density of 60 pounds per cubic foot, the equivalent in-place volumetric loading at the Type I/II cell is expected to be approximately 170,000 cubic yards per year. At this loading rate the Type I/II cell is expected to have a life of approximately 10 years in this configuration (1.74 million cubic yards available divided by a maximum 170,000 cubic yards per year loading rate).

To accommodate additional Type I/II wastes, should Type I/II disposal volumes increase beyond those currently projected, CWI proposes that some or all of the abandoned borrow area/pond in the northwest portion of the site (Figure 5) be constructed as Type I/II cells instead of Type III cells, as presented herein. To this end, this potential Type I/II expansion area has been evaluated in accordance with the requirements for both Type III and Type I/II cells. This evaluation included the subsurface investigation (Figure 10 shows the locations of all borings advanced at the facility) and geotechnical analysis portions of the landfill design process. Details of this analysis and the results generated are presented in the responses to LAC 33:521.D and E and in the TEI geotechnical report included in Appendix E, Part E.3. The results of this evaluation indicate that the abandoned borrow area/pond is suitable for use as Type I/II landfill cells.

Maximum cut elevations for the landfill, Type I/II Leachate/Contact Water Treatment Area impoundments, and Type III contact water Sedimentation Pond bottoms have been developed to meet the following criteria:

- All excavation elevations will be within the suitable, low-permeability soils (CH, CL, ML, ML/CL, or CH/CL) prevalent in near surface soils across all areas of the site;
- A minimum barrier of 3 feet of suitable, low-permeability soils will remain in place below all excavations located in Type III areas; and
- No excavation depths will exceed the maximum allowable depth to prevent vertical heave.

Maximum cut elevations for the abandoned borrow area/pond have been developed for both Type III and Type I/II cell construction using these guidelines. The results of cut elevation determination analyses, slope stability analyses, and settlement analyses for the landfill design are included in Appendix E, Part E.2 (Eustis Engineering Company, Inc. initial slope stability analysis), and Part E.3 (TEI supplemental geotechnical report).

Although the lithological information available for the site indicates that the proposed excavations will meet all of the criteria listed above, it is assumed that excavations in some areas between soil boring locations could potentially encounter isolated pockets of unsuitable (relatively higher-permeability) soils in the forms of isolated zones or lenses. If such soils are encountered, they will be excavated and replaced (bridged) with at least three feet of suitable, low-permeability soils. Such bridging will be keyed into the surrounding natural, low-permeability soils.

All layout and design information presented in the remainder of this application will address only the currently proposed Type I/II acreage (approximate 30 acre footprint plus the 8 acres of "piggybacked" Type I/II area) and Type III acreage (approximately 55 acres, including the 8 "piggybacked" acres) as shown on Figures 5, 21, and 23. Should actual waste loadings necessitate the conversion of some or all of the abandoned borrow area/pond from Type III cells to Type I/II cells in the future, CWI will submit a permit modification application at that time to formally request expansion of the Type I/II areas of the facility to this area.

**b. detailed drawings of slopes, levees, and other pertinent features; and**

Response:

Master site improvements are shown on Figure 6. Detailed drawings of slopes, levees, and other pertinent features are included on Figures 21 through 33. Final landfill contours and cross-sectional profiles are shown on Figures 34 and Figures 35a and 35b, respectively. The lines and grades shown on the drawings were developed based on the cut elevation determination analyses, slope stability analyses, and settlement analyses for the landfill design, which are included in Appendix E, Part E.2 (Eustis Engineering Company, Inc. initial slope stability analysis), and Part E.3 (TEI supplemental geotechnical report).

**c. the type of material and its source for levee construction. Calculations shall be submitted demonstrating that an adequate volume of material is available for the required levee construction.**

Response:

Soil excavation will be performed at the site for construction of the landfill cells to allow for the development of the optimum airspace within the available footprint. The lines and grades of these excavations are shown on Figure 21. A comparison of these lines and grades to the existing contour elevations at the site (Figures 5, 6, and 12a through 12g) yields the soils available for berm and levee construction. As discussed in the responses to LAC 33:VII.521.D, all excavations will include predominantly the clay (CH) and silty clay (CL) materials that comprise the uppermost soils across the entire site. These clays and silty clays will be used for levee and berm construction. Calculations demonstrating that these materials will provide an adequate volume of material to construct all levees and berms at the facility are included in Appendix F, Part F.1. Borrow soils available onsite are estimated to exceed those needed for use in berm construction and daily, interim, and final soil covers by approximately 84,000 cubic yards.

**3. The following information on plans and specifications is required for Type I, II, and III landfills:**

**a. approximate dimensions of daily fill and cover; and**

Response:

In the Type I/II cells, waste will be deposited in the smallest practical area each day and compacted. Based on a projected waste volume of 500 tons/day, the dimension of the daily work area is expected to be about 40 x 80 feet. At the end of each day that waste is deposited in the landfill, a cover material will be applied to the waste to minimize vector-breeding areas and animal attraction, control leachate generation, reduce fire hazard, minimize blowing paper and litter, reduce noxious odors, provide an aesthetic appearance, and allow accessibility regardless of weather. Daily cover material may be silty or sandy clay earth material, a minimum of 6 inches thick; foam; Topcoat®, or similar spray-on slurry; or portable waterproof panels (tarps).

When foam, Topcoat®, or similar spray-on slurry, or tarps are used as daily cover, earth material will be placed at the end of each work week. The earth cover material will be conveniently stockpiled onsite, the tarps will be stacked close to the working face, and/or foam materials and application equipment will be stored near the scale house area and brought to the working face for application, as applicable. Similarly, Topcoat®, or similar spray-on slurry material and application equipment will be stored onsite and brought to the working face for application. Operational methods and additional data for tarps, foam, and Topcoat® (or similar spray-on slurry) are included in the Facility Operations Plan.

Interim cover or interim compacted cover will be applied over operating areas, which will not receive waste for a period longer than 60 days. Interim or interim compacted cover shall be placed within 48 hours of the last receipt of waste in the operating area. In general, the waste will be placed and compacted to a thickness of approximately 12 to 15 feet prior to receiving interim cover. Interim or interim compacted cover will be silty clays applied at least 12 inches, or 24 inches thick, respectively.

In the Type III cells, waste will be deposited in the smallest practical area each day and compacted. The waste shall be covered with a minimum of 12 inches of earth fill, at least every 30 days. In general, the waste will be placed and compacted to a thickness of approximately 12 to 15 feet prior to receiving interim cover. Interim cover shall be as required for control of blowing debris, vector breeding, animal or bird attraction, erosion, fire hazard potential, and odors; provide aesthetic appearance to the landfill operation; or allow accessibility regardless of weather. The approximate daily operating area is 40 feet wide by 70 feet in length.

**b. the type of cover material and its source for daily, interim, and final cover. Calculations shall be submitted demonstrating that an adequate volume of material is available for daily, interim, and final cover.**

Response:

**Daily Cover:** Daily cover material is not required for the Type III landfill cells. As described in 521.F.3.a., above, daily cover materials for the Type I/II cells will include silty or sandy clay earth material, a minimum of 6 inches thick; foam; Topcoat®, or similar spray-on slurry; or portable waterproof panels (tarps). The source of the earth material will be onsite excavations in the area of the proposed landfill cells. Calculations of fill material requirements and borrow material availability are presented in Appendix F, Part F.1. The tarps, Topcoat®, or similar spray-on slurry, and/or foam will be obtained from available commercial sources. Operational methods and additional data for tarps, foam, and Topcoat® (or similar spray-on slurry) are included in the Facility Operations Plan.

**Interim Cover and Interim Compacted Cover:** Interim and interim compacted cover for Type I/II cells will be silty clays from onsite excavations. Calculations of interim and interim compacted cover requirements and onsite borrow availability are presented in Appendix F, Part F.1.

**Interim (Monthly) Cover:** Interim (monthly) cover for Type III cells will be obtained from onsite excavations. Calculations of monthly cover requirements and onsite borrow availability are presented in Appendix F, Part F.1.

**Final Cover:** As described in the response to LAC 33:VII.521.J.2.a., the final cover system for the Type I/II cells will consist of: an erosion control vegetative layer, a drainage layer, an infiltration barrier, and a gas collection layer. The erosion control layer will consist of 12 inches of select topsoil with vegetation (mulched and seeded with appropriate grasses). The drainage layer will be a double-sided geocomposite. The infiltration barrier layer will include a 60-mil LDPE geomembrane and a geosynthetic clay liner (GCL) on the top portion on the landfill cover, and on the benches; and a GCL on the side slopes. Beneath the infiltration barrier layer, a gas collection layer, consisting of 12-inches of sand, will be placed over the interim compacted cover, which overlies the waste. The geosynthetic materials will be obtained from specialized vendors and installed by specialty contractors. The topsoil will be obtained from onsite sources, and/or from commercial sources in the area. The sand materials required for construction of the cover are readily available in the area, and will be obtained commercially from offsite sources.

The final cover system for the Type III cells includes an erosion control vegetative layer, and an infiltration barrier. The erosion control layer will consist of 6 inches of select topsoil with vegetation, and the infiltration barrier layer will consist of 24 inches of silty clay. As noted above, the topsoil will be obtained from onsite sources and/or from commercial sources in the area. The infiltration barrier materials will be silty clay (CL) soils stockpiled from onsite excavations.

Calculations demonstrating the volume of final cover material available onsite are contained in Appendix F, Part F.1.

**4. The following information on plans and specifications for the prevention of groundwater contamination must be submitted for Type I and II facilities:**

**a. representative cross-section and geologic cross-sections showing original and final grades, approximate dimensions of daily fill and cover, drainage, the water table, groundwater conditions, the location and type of liner, and other pertinent information;**

Response:

Site geologic cross sections are shown on Figures 12A through 12G and include original grades, final grades prior to installation of the liner, and water table elevations. Figure 21 shows the grade plan for the site prior to liner and/or waste placement. Figure 34 shows the final contours of the closed landfill and Figures 35a and 35b depict cross sections of the landfill after it is closed. These final cross sections include original ground surface, cell bottom, and final cover profiles and elevations. They also depict the "piggybacked" areas of Type I/II cells over Type III cells. Figure 22 shows the location and drainage grades of the liner in the Type I/II cells and the Type I/II Leachate/Contact Water Treatment Area impoundments as well as the cell bottoms and drainage grades of the Type III cells. Figure 23 identifies the location and drainage grades of the "piggybacked" areas of the Type I/II cells over Type III cells. A description of the liner is described in the response to LAC 33:VII.521.F.4.b. Approximate dimensions of daily fill and cover were described previously in the response to LAC 33:VII.521.F.3.a. Groundwater conditions were described in the response to LAC 33:VII.521.E and in the Groundwater Monitoring Plan (Appendix A).

**b. a description of the liner system, which shall include: calculations of anticipated leachate volumes, rationale for particular designs of such systems, and drawings; and**

Response:

Figure 22 shows the location and drainage grades of the liner in the Type I/II cell (Cell I/II-A). The figure also shows the cell bottoms and drainage grades of the Type III cells (Cells III-A through III-M). Figure 23 identifies the location and drainage grades of the "piggybacked" areas of the Type I/II cell over Type III cells.

CWI proposes to utilize either a conventional liner system, as per LAC 33:VII.711.B.5.d.ii, or an alternative, improved liner system in the Type I/II cell. As shown on Figure 25, either a conventional composite liner system or a composite geosynthetic liner system will be utilized for the Type I/II cell. The primary liner is a geomembrane as required by the regulations; however, ~~instead of~~ as an alternative to the typical secondary compacted clay liner (CCL), a geomembrane-supported geosynthetic clay liner (GS/GCL) product in conjunction with a 1-foot compacted clay liner, which provides for equivalent or better hydraulic performance, is proposed. Therefore, a petition for exemption from the requirements found in LAC 33: VII.711.B.5.d.ii is being submitted under separate cover. A drainage layer, such as a geocomposite drainage net (geonet), with 8-oz. non-woven geotextile on both sides, may be utilized beneath the compacted clay liner for construction purposes if deemed necessary by the Engineer.

The proposed alternative liner system is hydraulically equivalent to the conventional composite liner system required by the regulations (using a CCL component) due to its lower potential water flux (i.e., volume of flow across a unit area in a unit time). If selected at the time of construction, the alternative composite geosynthetic liner system will be constructed on the compacted clay liner, and will include the following components (top to bottom), as shown on Figure 25:

- A primary liner, consisting of a 60-mil, textured, ~~white-surfaced,~~ high density polyethylene (HDPE) geomembrane ~~(white-side up)~~ over the bottom of the cell, and on side slopes;

- A secondary liner, consisting of a 60-mil geomembrane-supported GCL (GS/GCL) liner installed with the geomembrane side down on 1 foot of compacted clay. The GS/GCL will utilize a textured geomembrane. The compacted clay liner will have a hydraulic conductivity no greater than 1x $10^{-7}$ cm/sec.

If the conventional composite liner system is selected at the time of construction, it will be constructed on the prepared subgrade, and will include the following components (top to bottom), as shown on Figure 25:

- A primary liner, consisting of a 60-mil, textured, high density polyethylene (HDPE) geomembrane over the bottom of the cell, and on side slopes;

- A secondary liner, consisting of 3 feet of compacted clay. The compacted clay liner will have a hydraulic conductivity no greater than 1x $10^{-7}$ cm/sec.

As shown on the drawings, the liner system will extend over the bottom of the cell, up the sides of the excavation and perimeter dike slope, to the anchor trench located on the crest of the perimeter berm. Excavation side slopes will have a maximum inclination of 3(H):1(V). The drainage area inverts and ridge lines and the leachate collection pipe trenches and sumps will be contoured out of the underlying prepared subgrade. The liner slope to leachate collection piping (i.e., from ridge to invert) will be 2% minimum. Shallow trenches designed to minimize liner stresses while holding the liner in place will be used to anchor the liner materials.

Equivalency calculations for the proposed alternative liner versus the conventional liner system required by the regulations are presented in Appendix F, Part F.2, along with supporting geotechnical calculations for the liner system design. The permeability of the bentonite layer of the GS/GCL is approximately 5 x $10^{-9}$ cm/sec. As shown in the calculations, liquid flux through the GS/GCL is controlled by water vapor diffusion through the geomembrane backing. The effective hydraulic conductivity, or permeability, of the combined GCL and geomembrane is approximately 4 x $10^{-12}$ cm/sec (not including the 1 foot of compacted clay), superior to that of the typical CCL, which is about 1 x $10^{-7}$ cm/sec. The water flux (see Appendix F, Part F.2 for calculations) through the proposed alternative secondary liner can therefore be expected to be 2,000 times less than a typical compacted clay liner. The technical equivalence of the GS/GCL has been researched by Koerner and Daniel (1993) and Daniel (1993). The research considers three areas of equivalency, including hydraulic issues, physical/mechanical issues, and construction issues. Generally, the GS/GCL has been found to be superior to the CCL with respect to hydraulic issues. Additional advantages of the GS/GCL secondary liner include ease of construction and availability of material; the ability to obtain intimate contact between the GS/GCL and the underlying compacted clay, and the fact that the GCL is securely attached to the supporting geomembrane layer; the use of the GS/GCL increases the available airspace in the cells; the GS/GCL is not affected by wet-dry or freeze thaw cycles; and the bentonite portion of the GS/GCL is self-healing in the event of a puncture. Although the CCL has better chemical absorption capacity, and greater puncture resistance than the GS/GCL, the GS/GCL acts as a secondary liner, and the chemical absorption property is not a critical concern. In addition, the puncture resistance should not present a problem, due to the presence of a 1-foot sand drainage layer, and a 1-foot operational cover, both of which overlie the primary liner. In addition, the compacted clay liner will be carefully prepared to remove any potentially damaging materials, such as roots or sharp objects. As noted previously, the GCL has also been shown to have excellent "self-healing" properties when punctured.

Figures 6, 21, 22, 23 and 28 show the location and dimensions of the liner in the Type I/II Leachate/Contact Water Treatment Area impoundments (which include the Leachate Holding Pond, the Type I/II Contact Water Equalization Pond, and the Type I/II Contact Water Biological Reactor), which will service the Type I/II cells. CWI proposes to utilize an alternative, improved liner system in this application also. As shown on Figure 29, a composite geosynthetic liner system, very similar to the one proposed for the Type I/II waste cell liner system, as described above, will be utilized for these three impoundments. The only differences between this liner system and that proposed for the waste cells is ~~are~~ the use of a ~~black geomembrane as the primary as opposed to the white-surfaced geomembrane liner proposed for the waste cells, and the use of a~~ fabric-formed concrete protective liner over the upper geomembrane. The impoundment liners will include:

- A primary liner, consisting of a 60-mil, textured, black, high density polyethylene (HDPE) geomembrane over the bottom of the cell and on side slopes;

- A secondary liner, consisting of a 60-mil geomembrane-supported GCL (GS/GCL) liner installed with the geomembrane side down on 1 foot of compacted clay. The GS/GCL will utilize a textured geomembrane. The compacted clay liner will have a hydraulic conductivity no greater than $1x\,10^{-7}$ cm/sec.; and

- A fabric-formed concrete surface liner, placed over the top of the primary liner. A fabric envelope in a mat configuration will be positioned over the geotextile filter cushion overlying the liner surface and will be filled with a pumpable sand/cement slurry in such a way as to form a stable mat of suitable weight and configuration.

~~White-surfaced geomembranes are less susceptible than black geomembranes to thermally-induced wrinkling (unlike the black surface, which absorbs sunlight and its thermal energy (heat), the white surface reflects sunlight, drastically reducing thermal expansion (causing wrinkling). Minimization of this thermally induced wrinkling makes the installation process less problematic in the large areas to be covered by in the waste cells. However, in the Type I/II Leachate/Contact Water Treatment Area impoundments, the areas to be covered are relatively small and such thermally induced wrinkling is not expected to be an issue. The installation process closely monitored to avoid thermally induced wrinkling problems.~~

The fabric-formed concrete liner will be placed over the upper geomembrane of the liner system to:

- protect the liner system from punctures;
- allow for cleanout of the pond; and
- provide sufficient load to the liner system to ensure intimate contact between the lower geomembrane and the underlying subbase and prevent GCL swelling (and associated increases in permeability) in the event of a leak in the upper geomembrane.

A 16-ounce non-woven geotextile will be placed between the upper geomembrane and the fabric-formed concrete liner to protect the geomembrane from any potential damage.

As shown on the drawings, the liner system will extend over the bottom of the pond, up the sides of the excavation and perimeter berm slope, to the anchor trench located on the crest of the perimeter berm as shown on Figure 29. Excavation side slopes will have a maximum inclination of 3(H): 1(V).

Equivalency determinations for the proposed pond liner versus the conventional liner system required by the regulations follow the same logic presented above for the waste cell liner, and are included in Appendix F, Part F.2, along with supporting geotechnical calculations for the Type I/II Leachate/Contact Water Treatment Area impoundment liner system design.

Both the Type I/II landfill cells and the Type I/II Leachate/Contact Water Treatment Area impoundments will be installed in accordance with the Construction Quality Assurance (CQA) Plan presented in Appendix G.

As described below in the response to LAC 33:VII.521.F.4.c, leachate volume calculations were performed for several scenarios. These scenarios range from newly constructed active areas to the Type I/II cell with final cover. The leachate volumes were estimated based on design storms, engineering calculations, and the Hydrologic Evaluation of Landfill Performance (HELP) Model, Visual HELP 2.1, as applicable. The Hydrologic Evaluation of Landfill Performance (HELP) Model, established by the EPA, generated infiltration and leachate values for various profiles of the landfill throughout its course of operation. Below are a list of the five scenarios that were created and a brief description of each.

- CWI Profile 1 represents the landfill at its final stage. All waste (approximately 80 feet) has been placed and the final cover has been installed. Profile data were generated for thirty-year return period storm over the entire Type I/II cell (30 acres).

- CWI Profile 2 represents the landfill at the time all waste (approximately 80 feet) has been placed and covered by a 2-foot layer of interim compacted cover. Profile data were generated for a thirty-year return period storm over the entire Type I/II cell.

- CWI Profile 3 represents the landfill when only half of the waste (40 feet) has been placed and covered with a 2-foot interim compacted cover. Profile data were generated for a thirty-year return period storm over the entire Type I/II cell.

- CWI Profile 4 represents the landfill when only half of the waste (40 feet), but no compacted interim cover, has been placed. Profile data were generated for a twenty five-year return period storm over 5 acres of the landfill. Only 5 acres were chosen, because this condition will exist only on the working face.

- CWI Profile 5 – This profile structure represents a scenario in which only about 5 feet of waste has been placed on the operational cover and no interim compacted cover has been placed. As in profile 4, this profile was generated for a twenty five-year return period storm for only 5 acres. This area will also only exist on the working face until the first bench has been established in the entire cell.

The following is a summary of layers and their use in various profiles:

| Layer | Type | Material | Thickness | Profile |
|---|---|---|---|---|
| 1 | Vertical Percolation | Topsoil | 1 ft | 1 |
| 2 | Geotextiles and Geonets | Triplanar Geonet | 350 mil | 1 |
| 3 | Geomembrane Liner | GM | 60 mil | 1 |
| 4 | Barrier Soil Liner | GCL | 1 in | 1 |
| 5 | Vertical Percolation Layer | Gas Collection Layer | 1 ft | 1 |
| 6 | Vertical Percolation Layer | Interim Compacted Cover | 2 ft | 1,2 |
| 7 | Vertical Percolation Layer | Waste | | 80'- 1&2<br>40'- 3&4<br>5'- 5 |
| 8 | Vertical Percolation Layer | Operational Cover | 1 ft | 1-5 |
| 9 | Lateral Drainage Layer | Sand | 1 ft | 1-5 |
| 10 | Geomembrane Liner | GM | 60 mil | 1-5 |
| 11 | Barrier Soil Layer* | GCL | 1 inch | 1-5 |
| 12 | Barrier Soil Layer* | GCL | ≈0 inch | 1-5 |
| 13 | Geomembrane Liner | GM | 60 mil | 1-5 |

*** Layers 12 and 13 cumulatively model the 1" thick GCL in the liner. Layer 13 was added to meet the software program restraints (i.e. the program does not allow the placement of a Barrier Soil Layer between two Geomembrane Layers).**

Raw Data resulting from the HELP Model for each of the five profiles is included in Appendix F.3. The estimated leachate volumes generated for the different profiles is summarized as follows:

| Profile | Average Annual Leachate (ft.$^3$) | Average Daily Leachate* (ft.$^3$) | Peak Daily Leachate (ft.$^3$) |
|---|---|---|---|
| Profile 1 – every layer in place | 0.468 | 0.00128 | 0.00193 |
| Profile 2 – 80' of waste with | 21,934 | 60 | 70 |

| | | | |
|---|---|---|---|
| interim cover | | | |
| Profile 3- 40' of waste with interim cover | 21,934 | 60 | 70 |
| Profile 4 – 40' of waste with no cover | 386,096 | 1,058 | 3,295 |
| Profile 5- 5' of waste with no cover | 387,106 | 1,061 | 3,007 |

*** Average Annual Leachate and Peak Daily Leachate were generated directly by the HELP Model. Average Daily Leachate was calculated by dividing the Average Annual Leachate by 365 days (per year).**

These estimated leachate volumes, along with Standard 25 Year/24 Hour Storm volume calculations, were in turn used to establish pipe sizes and spacing, drainage media hydraulic requirements, temporary berm locations and sizing, sump storage and transfer (pumping) requirements, and equalization pond sizing and mechanical requirements. Leachate collection and removal system design calculations are presented in other sections of Appendix F, as described below.

**c. a description of the leachate collection and removal system, which shall include calculations of anticipated leachate volumes, rationale for particular designs of such systems, and drawings.**

<u>Response</u>:

The working relationship between the facility's Type I/II leachate and contact water collection, removal, and treatment structures and systems is presented here. Although both Type I/II leachate and contact water are considered contaminated waters by regulatory definition, the leachate will exhibit much higher contaminant loadings and organic content. To facilitate more efficient operation and better environmental management of the facility, Type I/II leachate and contact water will be handled by two distinct and separate systems in the Type I/II areas. To accomplish this, a traditional leachate collection system (LCS) will be constructed in the cells and non-traditional water management procedures will be utilized to collect, remove, and treat the two waters separately.

The proposed LCS will be a traditional sawtooth design, with leachate collection piping located in the inverts, and with a minimum 2% slope between inverts and ridges. Piping will have a minimum 1% longitudinal slope toward the leachate collection sumps. Drainage piping in each invert will be directed to a sump, which will collect the leachate for removal to the leachate treatment impoundment. The location and drainage grades of the LCS are shown on Figures 22 and 23. Details of the system are shown on Figures 25 through 27 and Figure 32.

The LCS will include a 12-inch sand layer on the landfill bottom, and a ~~tri-planar~~ geocomposite drainage net (geonet), with 8-oz. non-woven geotextile on both sides, on the side slopes. <u>Design calculations have been performed to determine the required and allowable transmissivities for the geocomposite and are presented in Appendix F.4.</u> The sand layer and the geonet will be placed directly over the primary 60-mil HDPE geomembrane liner. The sand drainage layer will in turn be overlain by a filter geotextile. A 12-inch thick operational cover of clean fill soil will be placed over the sand layer/filter geotextile, and over the geonet on the slopes.

Invert and perimeter leachate collection drains will be perforated (1/2" perforations at 2" on center), 8-inch diameter, SDR-15.5, HDPE pipe, located as shown on the drawings. The leachate pipe will be embedded in No. 57 stone, with a 16-oz. non-woven geotextile fabric on three sides (see Figure 26 for details).

Leachate collection sumps will be located within the lined cell as shown on Figures 22 and 23, and as detailed on Figure 26. The sumps will be backfilled with No. 57 stone as shown on Figure 26. The stone will in turn be wrapped with a 16-oz. non-woven geotextile. Leachate extraction risers will be 12-inch diameter HDPE pipe. The intake end of the riser pipe (within the sump) will be perforated. The leachate removal pump will be a submersible pump lowered into the sump from the access point located on the perimeter dike. Clean-outs are provided for all leachate collection system pipes as detailed on Figure 26.

The following describes the procedures to be used to separately collect, remove, and treat the leachate and contact water in the Type I/II areas. The primary mechanism to keep Type I/II leachate and contact water separate will be the relative impermeability of the operational cover (1-foot thick silty clay and clay layer) over the lateral leachate collection system (1-foot thick sand layer) and the sealing of the leachate collection line trenches until waste is actually placed over the trench. The trenches will be sealed with a geomembrane until just prior to waste placement over the trenches, when the geomembrane will be removed, exposing the trench to the overlying waste placed on it. Details of the temporary geomembrane cover over the trench are shown on Figure 26. This system will prevent any surface drainage of contact water from entering the LCS.

Leachate will be collected in the LCS and sumps and pumped through 2-inch diameter SDR 17 HDPE pipe, installed within the 12-inch diameter extraction riser, to a 2-inch diameter, aboveground SDR 17 HDPE Leachate Transfer Line located on the southern perimeter berm of the Cell I/II-A, as shown on Figure 22. The Leachate Transfer Line will transfer the leachate to the Leachate Holding Pond located in the Type I/II Leachate/Contact Water Treatment Area, as shown on Figures 22 and 28.

As stated above, although considered the same by regulatory definition, Type I/II leachate and contact water will be handled and treated separately at the facility. Contact water within the active phases of the Type I/II cells will consist of stormwater that drains over the surface of the waste plus any stormwater falling on active phases where no waste is yet present. The waters will surface drain down the waste face, both covered and open, and drain over the top of the operational cover to temporary sumps located in the downgradient areas of the cell. Portable pumps and flexible hoses will be utilized to pump the sumped waters to an aboveground, 6-inch diameter SDR 26 HDPE Contact Water Transfer Line located on the southern perimeter berm of the Cell I/II-A, as shown on Figure 22. The flexible hoses will be connected to the Contact Water Transfer Line, as needed, via quick-connect couplings in the transfer line. The Contact Water Transfer Line will transfer the contact water to the Type I/II Contact Water Equalization Pond, located in the Type I/II Leachate/Contact Water Treatment Area, as shown on Figures 22 and 28.

Treatment of the Type I/II leachate and contact water will likewise be separate. Leachate will be transferred to the Leachate Holding Pond located in the Type I/II Leachate/Contact Water Treatment Area, as shown on Figures 22 and 28. The Leachate Holding Pond's liquid levels will be maintained with a minimum freeboard of 2 feet below the pond berm elevation of 69.5 feet, mean sea level (msl). A surface aerator/mixer in the pond will promote aerobic biological degradation of the organic contaminants in the leachate during its storage there. The leachate will then be recirculated periodically (estimated 2 to 3 hours per day) to the active Type I/II waste cells using flexible hose and a series of horizontal and/or vertical perforated pipes. The ultimate goal is that through this closed-loop system, no leachate will have to be treated or transported offsite. The re-application of the biologically degraded and activated/oxygenated leachate will promote aerobic stabilization of the receiving solid wastes. If leachate recirculation is not utilized, the leachate will be transferred to the Contact Water Equalization Pond after treatment in the Leachate Holding Pond. The Contact Water Treatment System has been designed to accommodate additional loading of pretreated leachate from the Leachate Holding Pond if the leachate is not recirculated.

Recirculation of the leachate will utilize horizontal and/or vertical perforated pipe. The horizontal pipes will be placed in trenches. This will promote adsorption into and percolation through the waste. This will also prevent the leachate from overland flow (over heavy cover materials). A detailed design of the recirculation system will be submitted to the LDEQ for approval prior to construction. On average, two to three hours per day of recirculation will be required to keep up with expected leachate volumes. However, this application rate will vary greatly with rainfall and the thickness of the solid wastes. The holding pond has been designed to hold 1.5 times the maximum Peak Daily Leachate Flow predicted by the HELP Model, as described in the response to LAC 33:VII.521.F.4.b, and therefore will have the capacity to store several weeks of leachate under normal conditions, allowing the landfill personnel to conveniently coordinate leachate recirculation activities with respect to site activities and weather conditions.

Contact water will be transferred to the Contact Water Equalization Pond located in the Type I/II Leachate/Contact Water Treatment Area, as shown on Figures 22 and 28. The Type I/II Contact Water Equalization Pond has been designed to provide both surge capacity and pre-treatment of the collected contact water from the Type I/II cell. As a pre-treatment system, the equalization pond will serve to provide a relatively constant loading rate to the subsequent primary biological treatment process, on the basis of both organic, mass, and nutrient loading rates, as well as the hydraulic loading rate. The principal benefits to be derived from the application of flow equalization are: (1) biological treatment is enhanced, because shock loadings are eliminated or minimized, inhibiting substances are diluted, and pH is stabilized; and (2) effluent quality and thickening performance of the secondary clarifier following biological treatment is improved through constant solids loading. Mixing and aeration incorporated into the equalization process will provide for blending the contents of the pond, and prevention of the contact waters becoming septic, respectively.

The Contact Water Equalization Pond's liquid levels will be maintained with a minimum freeboard of 2 feet (1 foot of freeboard and 1 foot of rainfall from the storm event on the pond surface) below the pond berm elevation of 69.5 feet, mean sea level (msl). The pond has been sized to store 1.2 times (includes safety factor) the maximum volume of contact water expected to be generated during a 25-year/24-hour storm assuming that the maximum working face surface area ever to be exposed over the life of the landfill will receive the design storm event. Once in the pond, a mechanical aerator will provide both mixing and aeration sufficient to both blend the pond contents and prevent septic (anaerobic) conditions in the pond. A continuous-operation pump (equipped with a flow meter and control device) will transfer the contact water to a Biological Reactor Cell, as described in Section 6.2 of the Facility Operations Plan in Appendix B, where it will undergo aerobic biological oxidation, secondary clarification, and onsite discharge via proposed LPDES Outfall 004.

The Biological Reactor has been designed to operate in the extended aeration regime based on the average daily rainfall hydraulic loading rate (design flow), which will be supplied from the Contact Water Equalization Pond at a constant rate, as described above. Extended aeration is best suited to varying waste streams (both in terms of flow rate and organic and nutrient loadings) and produces minimal biosolids, which will minimize sludge handling requirements for the system. The Biological Reactor has been sized to provide for a 36-hour hydraulic residence time, based on the above-mentioned design flow. This hydraulic residence time is at the upper end of the typical range for extended aeration systems (18 to 36 hours) to provide the maximum biological treatment time in the reactor. A single mechanical aerator in the reactor will provide both mixing and aeration to the reactor. The Biological Reactor will likewise be maintained with a minimum freeboard of 2 feet below the pond berm elevation of 69.5 feet, msl. Flow through the Biological Reactor and Secondary Clarifier will be driven by hydraulic displacement from the flow from the pump in the Equalization Pond.

The Secondary Clarifier will consist of 6 pre-fabricated modules designed specifically for extended aeration systems. Clarifier design was controlled by minimum overflow rate (200 gal./ft.$^2$), as opposed to clarifier surface area. The clarifier has been designed to incorporate air lift sludge recycling to the biological reactor at a ratio ($Q_R/Q$) of 1.5. An air lift scum removal system will also be included on the system. The clarifier will have a normally-opened discharge valve set at an invert elevation of 67.5 feet, msl. Freeboard in the Secondary Clarifier will likewise be maintained at 2 feet below its top elevation of 69.5 feet, msl. The discharge line from the Secondary Clarifier will be equipped with a check valve to prevent back-flow into the system in the event of a major (100-year) flood event.

The removal of leachate from the treatment stream will greatly reduce the strength of the waters to be treated in the system. By treating this low-strength water with the extended aeration process in the Biological Treatment System, which is very flexible and extremely efficient at treating the low-strength waters expected, the system will be very efficient at meeting the LPDES discharge standards.

As with the Type III Sedimentation Ponds, all discharges from the Type I/II Contact Water Biological Treatment System will be monitored and reported in accordance with the LPDES permit requirements. However, unlike the Sedimentation Ponds, discharges from this system will be continuous and a structured monitoring program will be required, again, in accordance with the LPDES Permit. In accordance with the LPDES Permit for the site, such discharges will be sampled and tested and the results reported to the LDEQ using the U.S. Environmental Protection Agency's (EPA's) Discharge Monitoring Report (DMR) form. Specific parameters to be tested, testing frequency, and respective discharge limitations for each parameter will be detailed in the LPDES permit, which will be available at the facility in the Gatehouse/Office at all times.

Additional details on the management and treatment of leachate and contact water are provided in the Facility Operations Plan, included in Appendix B. Bases of design, design assumptions, and design calculations for the various aspects of the leachate/contact water collection, removal, and treatment systems described above are provided in Appendix F, Parts F.4 and F.5.

As described in the Facility Operations Plan (Appendix B), stormwater in each cell will be managed to minimize the production of leachate and contaminated stormwater. This will be accomplished by minimizing the contact of stormwater and waste, and by minimizing, to the extent feasible, the infiltration of stormwater into the active areas of the cell. Relatively small active waste placement areas will be isolated using temporary berms. The active portions of the cell will be sized at about 60 days waste placement. As portions of the cell are filled, interim compacted cover (compacted silty clay 2-feet thick) will be placed over the waste to minimize infiltration. In addition, water draining off the surface of the interim compacted and final cover will be segregated and captured for discharge as uncontaminated stormwater.

The two Type III Sedimentation Ponds shown in Figures 6, 21, and 22 have been designed to store contact water (as described in the Facility Operations Plan included in Appendix B) for the purpose of sedimentation, periodic testing, and ultimate discharge of the waters through the LPDES Outfalls 001 and 002 (as described in the response to LAC 33:521.B.1.g). The ponds have been sized to provide sufficient storage for a 25-year/24-hour storm over the largest exposed area of Type III wastes at any one time. The water management procedures described in the Facility Operations Plan (Appendix B) have been developed to minimize these quantities. The design calculations for these two ponds are included in Appendix F, Part F.6. As the Type III areas near capacity, both ponds will be converted to waste cells.

A summary of the calculations of expected leachate volumes was presented in the response to LAC 33:VII.521.F.4.b. Raw Data resulting from the HELP Model for each of the five profiles is included in Appendix F.3. These estimated leachate volumes were in turn used to establish pipe sizes and spacing, drainage media hydraulic requirements, temporary berm locations and sizing, sump storage and transfer (pumping) requirements, and equalization pond sizing and mechanical requirements. Leachate collection and removal system design calculations are presented in Appendix F, Part F.4.

5. **The following information on plans and specifications for groundwater monitoring must be provided for Type I and II facilities:**

**a. a minimum of three piezometers or monitoring wells in the same zone must be provided in order to determine groundwater flow direction;**

Response:

Historic information on the groundwater flow direction at the site is available from BFI's groundwater monitoring program at the adjacent, closed Type I/II landfill. In addition, TEI installed seven piezometers for the purpose of determining the current groundwater flow direction. Details of these wells and piezometers and the information obtained from them was presented in the response to LAC 33:521.E.1.a.iii.

**b. for groundwater monitoring wells, cross-sections illustrating construction of wells, a scaled map indicating well locations and the relevant point of compliance, and pertinent data on each well, presented in tabular form, including drilled depth, the depth to which the well is cased, screen interval, slot size, elevations of the top and bottom of the screen, casing size, type of grout, ground surface elevation, etc.;**

Response:

As stated above, all information pertaining to the construction of the BFI monitoring wells are on file in the LDEQ's records and are not included in this permit application. Information regarding the construction of the seven temporary piezometers installed by TEI for CWI is provided in the response to LAC 33:521.D.1.b. CWI intends to install nine monitoring wells and two permanent piezometers at the facility for the purposes of monitoring groundwater quality and the potentiometric surface prior to accepting Type I/II waste. Details of the proposed construction of these wells and piezometers are provided in the Groundwater Monitoring Plan included in Appendix A. These details include a cross-section illustrating the construction of the wells, a scaled map indicating the well locations and the relative point of compliance, and pertinent data on each well, presented in tabular form, as described above.

**c. a groundwater monitoring program including a sampling and analysis plan that includes consistent sampling and analysis procedures that ensure that monitoring results provide reliable indications of groundwater quality;**

Response:

The Groundwater Monitoring Plan is included as Appendix A. The plan includes sampling and analysis procedures, detection parameters, and reporting procedures. As stated in the response to LAC 33:VII.521.F.5.b, the proposed new monitoring wells will be installed prior to the acceptance of any Type I/II wastes at the landfill.

**d. for an existing facility, all data on samples taken from monitoring wells in place at the time of the permit application must be included. (If this data exists in the Solid Waste Division records, the administrative authority may allow references to the data in the permit application.) For an existing facility with no wells,**

**groundwater data shall be submitted within 90 days after the installation of monitoring wells. For a new facility, groundwater data (one sampling event) shall be submitted before waste is accepted;**

Response:

As stated above, all existing monitoring wells at the facility were installed by BFI during their operations at the site. Groundwater Monitoring Reports documenting all data on samples taken from these wells have been submitted to LDEQ by BFI, are on file in the LDEQ's records, and are therefore not included in this permit application. However, data submitted by BFI in these reports have been utilized in the development of the Groundwater Monitoring Plan, included as Appendix A.

**e. a plan for detecting, reporting, and verifying changes in groundwater; and**

Response:

The Groundwater Monitoring Plan is included as Appendix A. The plan includes sampling and analysis procedures, detection parameters, and reporting procedures. As stated in the response to LAC 33:VII.521.F.5.b, proposed new monitoring wells will be installed prior to the acceptance of any Type I/II wastes at the landfill.

**f. the method for plugging and abandonment of groundwater monitoring systems.**

Response:

Plugging and abandonment of groundwater monitoring systems is described in the Groundwater Monitoring Plan (Appendix A). The methods for the plugging and abandonment of existing groundwater monitoring systems installed by BFI have been provided to the LDEQ as part of their permitting process and are on file in the LDEQ's records. They are not included in this permit application

**6. The facility plans and specifications for Type I and II landfills and surface impoundments (surface impoundments with on-site closure and a potential to produce gases) must provide a gas collection and treatment or removal system.**

Response:

The final cap design for the Type I/II cells includes a passive gas collection and venting system. Components of the system are shown on Figures 25 and 33 and include a 1-foot thick, contiguous gas collection layer (sand) on top of the interim compacted cover, which overlies the waste. A GCL will overlie the gas collection layer. The gas collection layer will vent to the atmosphere through passive vents. The locations of the vents on the landfill cap are shown on

Figure 36. Details of the passive gas vents are shown on Figure 33. The design calculations for the passive gas collection and venting system are included in Appendix F, Part F.7. Procedures for monitoring and maintaining the system are presented in the Facility Operations Plan, included in Appendix B.

If, at any time during the active life or post-closure period, gas measurements and subsequent calculations indicate that an active gas recovery and management system is necessary, such system will be installed.

# PART III
# ADDITIONAL SUPPLEMENTARY INFORMATION

(INCLUDES RESPONSES TO REVISED EXPANDED "IT DECISION" QUESTIONS AND SUPPORTING EXHIBITS)

# PART III

## ADDITIONAL SUPPLEMENTARY INFORMATION

(The form shall be completed in accordance with the instructions found in LAC 33:VII.523.)

**§523. Part III: Additional Supplementary Information**

**The following supplementary information is required for all solid waste processing and disposal facilities. All responses and exhibits must be identified in the following sequence to facilitate the evaluation:**

Response:

This response to the "IT" Questions is submitted on behalf of Consolidated Waste Industries, Inc. (CWI) in support of this application for a modification of the existing permit authorizing operation of the CWI-White Oaks Landfill facility (the Site) in Ouachita Parish, Louisiana. By way of the requested modification, CWI seeks authorization to laterally expand the facility as well as to accept Type I and Type II wastes, in addition to the Type III waste currently accepted at the Site.

**Site Background**

The background of the Site is particularly important in replying to the questions originally posed by the Louisiana Supreme Court in Save Ourselves v. Louisiana Environmental Control Comm. 452 So. 2d 1152 (La. 1984) (hereinafter "Save Ourselves"), as elaborated upon in subsequent jurisprudence. The Site began operations as a permitted solid waste landfill operated by Browning-Ferris Industries, Inc (BFI). The Site, as operated by BFI, was permitted to accept residential and industrial solid wastes and was intended "to serve the Ouachita Parish Area". (BFI Application at Part II, Section 6.4.3.A, p.1).

The LDEQ's 1996 decision granting the permit for operation of the Site was reviewed by the First Circuit Court of Appeal in Blackett v. Louisiana Department of Environmental Quality, 506 So.2d 749 (La. App. 1 Cir. 1987) (hereinafter "Blackett"). In Blackett, the court reviewed the LDEQ's decision and specifically found that the mandates of the Save Ourselves decision had been satisfied. In particular, the court recognized that the LDEQ and BFI had adequately considered and weighed the environmental, economic and social impacts associated with the operation of the Site and, additionally, had given appropriate consideration to mitigation measures and potential alternative locations for the facility.

Before the area initially permitted for solid waste disposal was utilized (approximately 50% of the area originally permitted for use by BFI being left unfilled), BFI sought and was granted approval for closure of the facility. Due to the timing of the closure, it can be inferred that the decision to close the facility was based on the desire to avoid the necessity of upgrading the facility to comply with the "Subtitle D" requirements imposed under the Louisiana solid waste regulations in 1993. Thereafter, in 1995, Littleton Enterprises, Inc. sought, and was granted approval, to operate the Site as a solid waste facility authorized to accept Type III wastes. The permit granted to Littleton Enterprises, Inc. was modified, in 1999, to reflect CWI as the operator. CWI now seeks authorization through this application for modification of the permit to laterally expand the facility and accept Type I & II wastes in conjunction with the continued acceptance of Type III waste.

Of the area affected by this application, only areas designated for disposal of Type III waste are outside of the area previously permitted under the BFI permit for acceptance of municipal and industrial solid waste. Thus, approval of the modification requested herein, as to Type I and II wastes, would essentially be a reinstatement of the approval provided to BFI and subsequently upheld by the court in Blackett.

The additional areas (designated for use as Type III waste disposal cells) have been extensively tested to determine their geologic suitability for use as a landfill, and it has been determined that the soils underlying these portions of the Site are the same as those underlying the area permitted under the BFI permit (refer to the response to LAC 33:VII.521.D, discussing the results of the soil testing). These soil types, as noted by the court in the Blackett decision, have been previously determined by LDEQ to be "suitable for landfills" due to the fact that there are "..natural clays sufficiently thick to inhibit the migration of leachate from the landfill." It is against this background that the following response to the IT Questions must be assessed.

**Questions Addressed**

Although this application requests a permit modification to allow operations in a manner similar to that already approved by the LDEQ in the context of the original BFI permit, CWI is mindful of LDEQ's responsibilities as Primary Public Trustee of the Environment. Accordingly, a response to all of the IT Questions is provided herein. The form of these questions is provided by the Solid Waste Regulations at LAC 33:VII.523.A-E, with guidance for content from the LDEQ's "Revised Expanded IT Questions". Particular attention has been given to those elements of the analysis emphasized in the jurisprudence. Where appropriate, responses will reference particular responses included in Parts I and II (LAC 33:VII.519 and LAC 33:VII.521, respectively) of this application and portions of the previous applications relating to the Site and other relevant documents in the LDEQ's possession.

**523.A. a discussion demonstrating that the potential and real adverse environmental effects of the facility have been avoided to the maximum extent possible;**

Response:

The various mitigating measures incorporated into the design and physical configuration of the facility, the operational and institutional controls to be utilized at the facility, and the siting considerations (site characteristics) of the Site, demonstrate that the potential and real adverse environmental effects of the facility, as proposed, have been avoided to the maximum extent possible.

In Blackett, the court recognized that the LDEQ's consideration of this issue was appropriate and supported by the record. This determination was based on an analysis provided by BFI, which set forth a number of potential adverse environmental effects, including: groundwater contamination, surface water contamination, air contamination (odor and dust) and methane gas migration. The potential for such adverse environmental impacts to occur has not changed in any significant respect, and these are the primary impacts addressed herein.

What has changed significantly in the context of CWI's current application are the measures to be undertaken in an effort to avoid these potential adverse environmental impacts to the maximum extent possible. Simply stated, the mitigation measures that will be implemented at the Site by CWI provide far greater protections to the environment than those that were utilized by BFI and, accordingly, the only conclusion that can be reached is that potential and real adverse environmental impacts have been avoided to the maximum extent possible. BFI's facility was permitted under the solid waste regulations in effect at the time of permit issuance. Since that time, the requirements mandated under Subtitle D of the Resource Conservation and Recovery Act (RCRA) have been implemented in Louisiana, via the promulgation in 1993 of the Louisiana Solid Waste Regulations (LAC Title 33, Part VII, Subpart 1). The current regulations – and those portions of the CWI proposal that go beyond the protections afforded by the new regulations – provide significantly greater environmental protections.

Of all of these regulatory improvements, perhaps most important is the requirement that a synthetic liner be installed to prevent the migration of leachate. See LAC 33:VII.711.B.5. The use of a liner, in conjunction with the superior geology of the site (as discussed in the response to LAC 33:VII.521.D), *will provide significantly greater protections against one of the primary* potential adverse environmental impacts to be guarded against – groundwater contamination. Additionally, CWI is requesting authority to <u>maintain the option of</u> utilize<u>ing</u> an innovative new synthetic secondary liner system that provides a greater measure of protection than the secondary compacted clay liner system required by the regulations, as discussed in the response to LAC 33:VII 521.F. Indeed, studies of the alternate secondary liner system <u>option</u> proposed by CWI indicate that it provides significantly greater protection against migration of leachate -- water flux through the proposed secondary (bentonite) portion of the liner being "...2,000 times less than..." the compacted clay liner required under the regulations. Equivalency documentation for the proposed liner is included in Attachment 1. The alternate secondary liner system (a bentonite based geomembrane-supported geosynthetic clay liner), unlike a compacted clay layer, is not subject to the "shrink/swell" effect of fluctuations in moisture and temperature and hence will better retain its superior level of impermeability. With its superior "self-healing" qualities, design location beneath a two-foot operational cover (1-foot)/sand drainage layer (1-foot) and use in conjunction with a primary 60-mil HDPE geomembrane, the alternate secondary liner system will truly provide maximum environmental protection.

Related measures include the mandatory use of a leachate collection system to facilitate the control of leachate. BFI actually utilized such a system, going beyond the regulatory requirements imposed at the time[1], but the BFI leachate control system differed from that to be used by CWI. As required by LAC 33:VII.711.B.4.b.vii (a) and LAC 33:VII.711B.5.d, the

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[1]Reference: BFI's original response to the "IT" Questions.

leachate collection system to be utilized by CWI will be installed above the synthetic liner, greatly enhancing its effectiveness.

Regarding leachate disposal, the BFI facility actually discharged treated leachate. The CWI facility will utilize an innovative system that aerates and recirculates leachate through a series of horizontal and/or vertical pipes placed in the waste. Aeration of the leachate will biologically degrade the leachate and the re-application of the biologically degraded and activated/oxygenated leachate will promote aerobic stabilization of the receiving solid wastes. Aerobic decomposition produces $CO_2$ rather than methane, thus reducing the potential methane emissions from the landfill. The ultimate goal is that, through this closed-loop system, waste volumes will be reduced, methane gas emissions will be reduced or eliminated, and no leachate will have to be treated or transported offsite. Note that this system goes beyond the requirements of the regulations as well as the design utilized by BFI. This system will enhance aerobic decomposition of the waste and help ensure the quality of surface water.

There are a number of other aspects of the facility that warrant attention. Many of these measures are of significance since they demonstrate that the CWI proposal goes beyond the regulations and/or those measures included within the BFI plan and provide proof that the design of the facility avoids potential and real adverse environmental impacts to the maximum extent possible. These measures include:

1.) The implementation of a Storm Water Pollution Prevention Plan (SWPPP). The implementation of such a plan was not previously required by law and hence the current proposal goes beyond the BFI facility plans previously approved by the LDEQ. The use of Best Management Practices (BMPs), required as part of the SWPPP, will provide significant additional protections for surface water quality.

2.) Asphalt paved roads within the facility. As noted in BFI's IT Questions response, dust emissions from the shell and limestone roads previously in place at the facility would periodically require mitigation through the use of water trucks. In contrast, all of the facility roads used for waste access to the CWI landfill cells are paved with asphalt (refer to the responses to LAC 33:VII.521.A). The use of asphalt roads within the CWI facility will eliminate this source of air emissions. Interior (temporary) haul roads within the cells will be covered with aggregate to minimize dust further. Should dust from the temporary roads still be a problem, water spray will be used to suppress dust. These improvements to the road system within the facility will significantly reduce particulate air emissions.

3.) The use of a more efficient methane collection system. Unlike the BFI facility, the CWI facility will utilize a porous gas collection layer overlain by synthetic geomembrane as part of its final cover system (refer to the responses to LAC 33:VII.521.J), which more efficiently and safely collects and vents methane gas. The use of this system will minimize potential adverse impacts from gas buildup within the waste cells.

4.) The use of a geonet in conjunction with a geomembrane as part of the final cover (refer to the responses to LAC 33:VII.521.J). Use of the geonet goes beyond the current regulatory requirements and is substantially superior to the final cover used by BFI. The geonet provides almost unrestricted removal of infiltrated stormwater, which reduces permeation and, ultimately, the creation of leachate. The use of the geonet also guards against failure of the final cover induced by hydraulic head pressure. This system helps avoid both surface and groundwater contamination.

5.) The restriction of excavation depths above permeable strata. The design of the landfill calls for maximum depth of excavation to be above all detected permeable water-bearing strata on the site, which means that, in addition to the proposed innovative liner system, there will be a layer of naturally occurring clay between the waste and any permeable strata, providing even greater protection to the groundwater.

6.) The inclusion of a concrete liner system in the Solidification Basin. The proposed design of the solidification basin at the landfill includes a concrete liner, which is not explicitly required by the regulations.

As to the other potential adverse impacts that can be expected from the operation of a solid waste landfill, a review of specific provisions of the application demonstrates that other potential adverse impacts have been avoided to the maximum extent possible.

Environmentally sensitive areas are avoided or protected by effective barriers. With the exception of minor fill requirements on marginal wetlands in the project area, for which a valid Section 404 Permit already exists, there are no sensitive environmental areas within the Site. Further, the response LAC 33:VII.521.A.1.e shows that other sensitive environmental areas (such as endangered species habitat) are not impacted by the location of the facility. As noted in the June 5, 2000 letter from the Louisiana Department of Wildlife and Fisheries (LDWF)(included as Attachment 2), "...no rare, threatened, or endangered species or critical habitats were found within the area of the captioned project that lies in Louisiana. No state or federal parks, wildlife refuges, scenic streams, or wildlife management areas are known at the specified site.." Additionally, there are no known historic sites or archeological resources in the vicinity of the Site.

The only potential area of concern would be proximity to the Russell Sage Wildlife Management Area (WMA), which is within 1,000 feet of the Site and located across Interstate 20. It should be noted that when originally permitted, the Site was farther than 1000 feet from the WMA. Only by way of a 1998 acquisition of acreage near the southeast corner of the Site has the WMA come to be located within 1,000 feet. Significantly, the solid waste regulations allow publicly owned recreation areas within 1,000 feet of a solid waste facility, if it is "..isolated... by effective barriers that eliminate probable adverse impacts." In the present case, such a barrier exists in the form of Interstate 20, which provides a substantial barrier between the Site and the WMA. Further, as noted in the Blackett decision, the presence of Interstate 20 as a barrier, as well as the levee and vegetative screening were sufficient to show that the LDEQ "...took into consideration the safeguards and precautions relative to the wildlife management area." That same conclusion can be reached in the context of this application for modification. Perhaps the most important information regarding potential impact of the proposed expansion on the WMA is contained in a letter (Attachment 3) from representatives of the Louisiana Department of Wildlife and Fisheries (LDW&F), the state agency with primary jurisdiction over the wildlife resources of the state, which states that LDW&F does "..not anticipate that we will be adversely impacted by the upgrade of the White Oaks Landfill and its operations to a Louisiana Type I/II Landfill Permit."

Flood-plain related impacts are minimized by way of mitigating measures: Although located within the 100-year flood plain (this is a potential "drawback" of the site which is far outweighed by the presence of suitable soil types commonly found in the flood plain, as explained in greater detail below), measures are incorporated into the facility plan that minimize the adverse impacts which can be expected to occur as a result of the location of the facility in this area. As noted in the response to LAC 33:VII.521.C, the facility will be enclosed by a levee that will provide a minimum of 2 feet of freeboard for the 100-year flood. In conjunction with normally-closed and check valves for the water outfalls which are incorporated into the design of the facility (refer to the responses to LAC 33:VII.521.F), the adverse impacts that may be expected from locating the facility in a flood plain are minimized to the maximum extent possible. It should be noted that the acreage to be elevated and enclosed by the levee is only approximately 46 acres more than the acreage that was originally permitted in the context of the BFI application. The remaining acreage is within the footprint of the BFI facility as originally permitted and, when reviewed by the court in Blackett, it was found that impacts on the flood plain had been adequately addressed. Even with a conservative calculation that assumes a full 85 acres of raised area, however, the impact on the temporary water storage capacity of the flood plain is negligible. Based on an estimated contiguous floodplain of 3,500 acres, there will be an increase of only .28 inches in the 100-year flood level as a result of the diking associated with the proposed landfill expansion. (refer to the responses to LAC 33:VII.521.C).

Odors and Disease Vectors are controlled through operational plans: As noted in the Facility Operations Plan, both disease vectors and odors will be controlled through operational plans which, in compliance with the solid waste regulations, minimize exposed putrescible wastes through the use of daily cover. In the event unusually strong odors are present, facility employees are required to take corrective measures.

Methane gas risks are minimized by way of operational controls and air monitoring. As previously noted, a safer, more efficient methane recovery system will be utilized at the facility than was used by BFI. In addition, however, a monitoring system and plans for cessation of landfill activity in affected areas has been adopted for the facility. The particulars of this plan are set forth in the Facility Operations Plan . It should be noted that 40 CFR 60, Subpart WWW requires control of emissions of non-methane organic compounds (NMOCs), but the requirements are size-based and the proposed CWI facility is smaller than the specified minimum size for imposing the control requirements. CWI acknowledges that implementation of additional control measures may be necessary in the future should emission data or regulatory changes indicate the necessity of such measures. In such a case, CWI will consider all available technological options, including flaring and power generation, although the use of leachate recirculation has the potential to render such measures unnecessary.

As discussed above, a number of facility design characteristics minimize the potential adverse affects to groundwater posed by any landfill operation. These include the special synthetic liner system proposed by CWI, as well as the proposed leachate collection and recirculation system (refer to the responses to LAC 33:VII.521.F). In addition, operational characteristics of the facility minimize potential adverse impacts to groundwater. These include groundwater monitoring and the careful control of incoming waste types (see the discussion of waste characterization and screening procedures in the Facility Operations Plan and the Industrial Waste Acceptance QA/QC Plan.

However, in any discussion of whether the potential adverse environmental effects of a proposed facility have been avoided to the maximum extent possible, the effect of the locational characteristics of a site cannot be overlooked. Indeed, in many circumstances, it could be argued that the location of the facility could have a greater "protective" effect than any pollution control device or operational constraint. As noted above, the Site was originally chosen – and has now been selected for the expansion that is the subject of this application for modification – in part because of the favorable geology of the site.

The hydrogeology of the Site is also important. As noted in the Aquifer Recharge Area Map (Exhibit J), the facility is located in the recharge area of the Alluvial Aquifer system. As indicated in the companion handbook to the base map of the above referenced map, "The alluvial aquifers are recharged through the direct infiltration of rainfall in the river valleys, lateral and upward movement of water from adjacent and underlying aquifers, and overbank stream flooding. The amount of recharge from rainfall depends on the thickness and permeability of the silt and clay layers that overlie the aquifers." Said handbook states further that "Soils of the alluvial valleys, modern flood plains, and low stream terraces are mapped as alluvium and are generally fine grained, but are considered to have high recharge potential because of the close interaction of surface water and groundwater in these areas." While the site is indeed located in the recharge area of the Alluvial Aquifer system, it must be noted that the favorable geology mentioned above will serve to deter groundwater flows to the aquifer in the event of leakage at the facility.

The risk of leachate contamination of aquifers is a critical concern, and has been recognized as a basis for denial or reversal of LDEQ permits.[2] The soil underlying the area inhibits the migration of leachate, therefore, locational characteristics alone act to significantly, if not completely, reduce what is perhaps the greatest threat to the environment posed by landfills. In regard to soil types, as described in the responses to LAC 33:VII.521.D, the Site is located on alluvial soils, which consist of clays and silty clays which act as a natural barrier to the migration of leachate in the unlikely event that all other control measures would fail. Both generally available information and site specific borings confirm the existence of layers of clays and silty clays underlying the facility – soils which the court in Blackett discussed in the context of its approval of the LDEQ's decision to originally permit the BFI facility at this location. It should be noted that CWI's design for the proposed expansion calls for excavation depths that are shallower than the first permeable water-bearing layers beneath the site, further reducing the risks to

[2] Reference is made to the LaDEQ's decisions related to the Cade I and Cade II landfill proposals.

groundwater. In regard to faults, the application demonstrates that there are no known faults in the area or within 1 mile of the Site boundaries. Clearly, the Site characteristics act to minimize, to the maximum extent possible, threats to groundwater.

Site characteristics help to minimize other potential adverse impacts as well. The facility is not located on or near any significant surface water body, thereby minimizing any potential adverse effects on surface water that may result from facility discharges. Potential sensitive receptors are not located near the facility (refer to the responses to LAC 33:VII.521.A). Within a 1-mile radius there are only three residences – a rental home and two mobile homes. Beyond these residences, the nearest residential development is 2.5 miles away. There are no health care facilities within 3 miles of the Site. The nearest school is 1 mile away – Ouachita Parish High School. The Site is favorably located with regard to adequate transportation infrastructure and the primary source of waste materials (the Cities of Monroe and West Monroe) and hence adverse impacts that may be expected from transportation (accidents and air pollution from truck traffic) are minimized. Although not zoned, area land uses are compatible, and the area is already home to solid waste disposal activities.[3]

The combined effect of the favorable location characteristics noted in BFI's and this application, the additional measures imposed by the new solid waste regulations, the innovative technologies proposed by CWI which actually exceed the protections required under the new solid waste regulations and the precedential value of the LDEQ's prior decision on the BFI application clearly demonstrate that the potential and real adverse environmental impacts of the proposed facility have been minimized to the maximum extent possible.

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[3] As discussed in greater detail below, the fact that the Site is already home to an existing solid waste disposal facility (Type III) and has already been utilized for the disposal of Type I and II waste is significant from the standpoint of the relative adverse impacts to be expected from locating the facility at the Site versus other potential alternative locations.

**523.E. a discussion and description of the mitigating measures which would offer more protection to the environment than the facility, as proposed, without unduly curtailing non-environmental benefits.**

Response:

The mitigating measures to be utilized at the Site, as set forth in the responses to LAC 33:VII.521, either meet or exceed all applicable regulatory requirements. A review of the primary mitigation systems and techniques demonstrates that there are no mitigation measures which would offer more protection to the environment than those proposed without unduly curtailing non-environmental benefits. Although discussed above in great detail in response to the question concerning avoidance or minimization of adverse environmental impacts, a listing of mitigation measures incorporated into the design and operational plans of the facility -- and particularly those that exceed the regulatory requirements – demonstrates that there are no additional mitigation measures which would offer more protection to the environment than the facility as proposed without unduly curtailing non-environmental benefits.

**a.) Liner System:** CWI's liner system (refer to the response to LAC 33:VII.521.F.4.b)~~,~~ will meet or exceed LDEQ requirements and ~~which utilizes an innovative secondary liner and provides significantly greater protection against the migration of leachate than the secondary liner required under the regulations,~~ provides a high level of environmental protection for groundwater.

**b.) Leachate Separation and Recirculation System:** CWI's design and operational plans call for the separation of leachate from contact stormwater, and recirculation of the leachate through the landfill cells (refer to the response to LAC 33:VII.521.F.4.c). This innovative system, which exceeds regulatory requirements, protects surface water quality by removing the most contaminated portion of the wastewater stream, stabilizes the waste pile by enhancing aerobic decomposition of the waste in the landfill, and reduces methane emissions via this enhancement of aerobic decomposition. As discussed above in the context of alternative technologies, recirculation of leachate is one component (the other being the addition of air) of "sustainable landfill" technology, the viability of which CWI will explore in the context of the expanded landfill.

**c.) Surface Run-off Controls and Other Measures to Reduce Generation of Leachate:** In conjunction with the leachate separation and recirculation system (refer to the response to LAC 33:VII.521.F.4.c), CWI's surface run-off control system is designed to minimize the amount of leachate generated by expediting drainage of water from the working face of the landfill and treating it separately from the leachate. Additionally, the use of the geonet and geomembrane for final cover will expedite the removal of infiltrated stormwater (refer to the response to LAC 33:VII.521.J.2.a), thereby reducing permeation and the creation of leachate.

**d.) Landscaping/Visual and Access Barriers:** As discussed in the responses to LAC 33:VII.521.B.1), and as required by the regulations, landscaping will be incorporated into the facility to enhance the appearance of the facility. Additionally, the facility will be surrounded by a fence to restrict access.

**e.) Groundwater Monitoring:** An extensive groundwater monitoring system (refer to the responses to LAC 33:VII.521.F.4 and the Groundwater Monitoring Plan) will ensure that if groundwater contamination does occur in spite of the control measures incorporated into the facility, it will be rapidly detected to allow corrective measures to be implemented.

**f.) An Efficient Methane Collection and Venting System:** CWI's facility will safely and efficiently collect and vent methane gas to avoid risks associated with buildup of methane gas (refer to the responses to LAC 33:VII.521.J).

**g.) Operational Controls:** CWI's Facility Operations Plan, Stormwater Pollution Prevention Plan (on file at the facility's offices) and Industrial Waste Acceptance Quality Assurance/Quality Control Plan assure that only appropriate wastes are accepted at the facility and that other potential adverse impacts are minimized.

**h.) Locational Characteristics:** Locating the facility at the Site, rather than an alternative location, is one mitigation technique that warrants discussion. As noted above, as well as in the BFI application, utilization of the Site greatly minimizes real and potential environmental costs due to land use considerations and the absence of any sensitive environmental areas in proximity to the Site. The fact that the Site is the location of an existing solid waste disposal facility further minimizes the adverse impacts that would result from siting a new facility to achieve the same disposal capacity. Finally, the advantages of the favorable geologic conditions at the Site, with its low permeability soils, combined with use of innovative liner system, leachate collection/ management systems and monitoring wells, all provide significant protection against adverse impacts.

In summary, the mitigation measures at the site, which exceed those utilized by BFI and, in many circumstances, exceed the current regulatory requirements provide significant environmental protections. Clearly, they provide the maximum possible environmental protection, without unduly curtailing non-environmental benefits.

# FIGURES

# APPENDICES

Appendix G

Construction Quality Assurance Plan